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An international comparison between final secondary assessments: Detected differences through an a priori analysis of tasks

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This paper presents a comparative study of the final secondary assessments in France, Italy and Chile, through the a priori analysis of tasks involving functions. We detect particularities in each expected resolution process, and we focus more specifically on the “availability” level of a piece of knowledge, which corresponds to activating it without any help or indication. At the core of the comparison, we distinguish between two degrees of availability: as “object” and as “tool”.

Keywords: Function, international comparison, transition high school/university.

CONTEXT OF THE STUDY

The aim of this paper is to have insight into what is expected from students at the end of secondary school. This can be a way to study the prerequisites “at the entrance” to university courses in mathematics. Analysing the tasks proposed in the secondary school final assessment seems to be a first possible approach. In this study, we want to present a comparison between three countries: Chile, France and Italy. France and Italy are two European countries with similar school systems, which have already been the object of a comparative study about the teaching of functions (Derouet & Panero, 2014). Including Chile allows us to enlarge and to enrich the comparison by considering a country with a different educational system. The Chilean secondary school ends at grade 12. The final assessment, called “Prueba de Selección Universitaria” (PSU), is a test that ranks students for accessing to university. However, it does not evaluate all the notions studied at secondary school. The PSU test in mathematics is a multiple-choice test. In France,

the secondary school goes from grade 10 to grade 12. At the end of this period, students have to pass an exam, called “Baccalauréat”, which is compulsory to enter university. The “Baccalauréat” varies according to section. In the scientific section, the exam in mathematics is composed of four exercises, with detailed questions. Finally, the Italian secondary school ends at grade 13 (so it lasts one year more than the Chilean and the French secondary school). The final exam is called “Maturità” and, as in France, it is necessary to access to university. In scientific section, the exam in mathematics consists of two problems, of which only one has to be solved, and 10 questions (the candidate chooses and solves 5 of them).

Clearly, preparing students for the final assessment represents one of the main aims of the last year of secondary school in each country. In our study, we focus on the tasks involving functions. And we wonder what mathematical activity is expected from students at the end of the secondary school in Chile, France and Italy.

A PRIORI ANALYSIS OF TASKS

We focus on one representative task on functions for each of the three countries and, through an *a priori* analysis, we try to detect particularities in each resolution process. We partially refer to the methodology of analysis of tasks introduced by Aline Robert (1998). Specifically, we wonder if the question is open or closed, we focus on the activated frames (Douady, 1986), working frames and registers (Duval, 1995). Moreover, we consider the adaptations to do (introducing steps, choosing a method, recognising the modality of application) as well as the expected level of activation of knowledge (Robert, 1998). We

focus on the “availability” level, which corresponds to activating knowledge without any indication in the statement. We can distinguish two degrees of availability. On the one hand, a certain notion/property can be recalled and employed as “object”: for example, the memorisation of a formula to directly work on the involved notion. We call it “availability as object”. On the other hand, a notion/property can be recalled and introduced by the students themselves as “tool”, to solve a question that does not involve directly the notion. We call it “availability as tool”. The degree of availability of knowledge is at the core of our comparison.

CONCLUSIONS

This analysis allows us to notice some remarkable differences between the assessments of the three countries. Our main result is the observation of a great dissimilarity at the level of availability and of autonomy expected from the students, linked to the degree to which the tasks are guided. Chilean students appear to be required to activate knowledge at a high level of availability as object. French students seem to be expected to mobilise some pieces of knowledge at the level of availability as tool, but the availability as object prevails, with little space left to autonomy. Italian students appear to be given more autonomy in solving tasks and in mobilising knowledge at a high level of availability as tool.

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